

Prevalence of stress among Iranian medical students: a questionnaire survey

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معدل انتشار الإجهاد بين طلبة الطب الإيرانيين: مسح استبائي

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الخلاصة: أجرى الباحثون دراسة مستعرضة شملت عدة قطاعات على قياس معدل تكرار التبليغ الذاتي عن أعراض الإجهاد بين أفراد عينة عشوائية وزائفة من طلبة الطب في أصفهان، بجمهورية إيران الإسلامية. وتم تجميع البيانات باستخدام مقياس كسلر ذي البُتود العشرة للإجهاد النفسي. وتبين أن إجمالي معدل انتشار الإجهاد بين 222 طالباً قد بلغ 61.3%. وأنه لا توجد فروق يُعتدُّ بها إحصائياً في مستويات الإجهاد بين الطلبة في المرحلة السريرية وقبل السريرية أو في مختلف سنوات الدراسة. وكانت أحراز الإجهاد لدى الطلبة المتزوجين أقل بكثير من أحراز الإجهاد لدى الطلبة غير المتزوجين مع عدم وجود أي اختلافات بين الجنسين. ثم إن الطلبة الذين قرروا دراسة الطب باختيارهم قد أحرزوا أحرازاً أقل من أحراز الإجهاد لدى أولئك الذين تأثروا بآراء الأسرة أو لم يكن لهم خيار في هذا الصدد. وكان الطلبة الذين يعانون من الإجهاد بدرجات طفيفة إلى معتدلة، أكثر تعرضاً للمشاكل البدنية (OR = 4.42). وقد دلت الدراسة على أن هناك حاجة إلى تدخلات للتعاطي مع الإجهاد وتحسين المعافاة البدنية والنفسية لطلبة الطب الإيرانيين.

ABSTRACT A cross-sectional study measured the frequency of self-reported stress symptoms among a weighted random sample of medical students in Isfahan, Islamic Republic of Iran. The data were gathered using the Kessler 10-item psychological distress scale. The overall prevalence of stress among 222 students was 61.3% and there were no statistically significant differences in stress levels between students in the pre-clinical and clinical phases or different years of study. Married students had significantly lower scores than single students but there were no differences between the sexes. Students who chose to study medicine had lower stress scores than those who were influenced by family or had no choice about the subject. Students with mild to moderate stress were significantly more likely to suffer physical problems (OR = 4.42). Interventions are needed to tackle stress and improve Iranian medical students' physical and psychological well-being.

Prévalence du stress chez les étudiants en médecine iraniens : une enquête par questionnaire

RÉSUMÉ Une enquête transversale a mesuré la fréquence des symptômes de stress rapportés par les étudiants en médecine d'Isfahan (République islamique d'Iran) inclus dans un échantillon aléatoire pondéré. Les données ont été collectées aux moyens de l'Échelle de détresse psychologique de Kessler en 10 items. La prévalence globale du stress chez 222 étudiants était de 61,3 % et aucune différence statistiquement significative n'a été observée dans le degré de stress entre les étudiants des deux premières années pré-cliniques et les étudiants des années cliniques ou des autres années d'étude. Les étudiants mariés avaient des scores nettement plus faibles que les étudiants célibataires, mais aucune différence entre les sexes n'a été relevée. Les étudiants qui avaient décidé eux-mêmes d'étudier la médecine avaient des scores de stress plus faibles que les étudiants en médecine dont le choix de carrière avait été influencé par leur famille ou qui n'avaient pas eu le choix. Les étudiants souffrant de stress léger à modéré étaient beaucoup plus susceptibles de présenter des troubles physiques (O.R. = 4,42). Des interventions sont requises pour s'attaquer au stress des étudiants en médecine iraniens et améliorer leur bien-être physique et psychologique.

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Introduction

In addition to coping with the normal stressors of everyday life, medical students must deal with stressors specific to medical school. These include information and input overload, financial indebtedness, lack of leisure time, and pressures of work, work relationships and career choices [1–3]. Although some degree of stress is a normal part of medical training and can be a motivator for some individuals, not all students find stress constructive [4]. For many individuals, stress arouses feelings of fear, incompetence, uselessness, anger and guilt and can be associated with both psychological and physical morbidity [5–9]. High levels of stress may have a negative effect on mastery of the academic curriculum, by impeding concentration, problem solving, decision making, completion of work and other abilities necessary for student learning [10,11].

Studies that have examined sources of stress among medical students generally point to 3 areas: academic pressures, social issues and financial problems [12]. Reported levels of stress among medical students range from 25% to 75% [13,14]. In the United States, a survey of 9 medical schools found that 47% of students had at least 1 major issue related to mental health or substance use and that stress affected 26% within this group [5]. A study in 3 British universities showed that the prevalence of stress was 31.2% [2]. Other studies showed that the prevalence of stress was 41.9%, 61.4% and 57% in Malaysian [14], Thai [15] and Saudi Arabian [16] medical schools respectively.

A study in the Islamic Republic of Iran showed that the prevalence of stress was 60.6% among medical students in Gorgan [17]. Nevertheless, there are few studies in the medical schools of our country. We therefore planned this study to assess the prevalence of stress among medical students attending the medical school in Isfahan city.

This information may aid in designing appropriate intervention strategies and planning modifications in the medical curriculum to enhance students' learning abilities.

Methods

Setting and sample

At the time of the study, Isfahan medical school had a 7-year study programme. The first 2.5 years are largely pre-clinical years (basic sciences) while the later clinical years are clinical rotations in health care facilities (hospital and polyclinics).

To recruit the sample, lists of students in each class were obtained from all departments of the medical school. Through weighted random sampling to reflect the distribution of students across the 7 classes 222 medical students enrolled in Isfahan medical school during the academic year 2009 were recruited into the study. Students who reported suffering from any psychological disorder were excluded.

Data collection procedure

Data collection was performed using the Kessler 10-item psychological distress scale (K10) which was developed by Kessler et al. to measure the level of distress and severity of psychological symptoms [18]. It was designed to measure current (1-month) distress in population surveys. The K10 comprises 10 questions of the form: "how often in the past month did you feel..." and offers specific symptoms such as "tired out for no good reason", "nervous" and "sad or depressed". The 5 possible responses range from "none of the time" to "all of the time" and are scored from 1 to 5 and then summed to give a total maximum score of 50. The cut-off scores used were those recommended by the authors: < 20 no stress; 20–24 mild stress; 25–29 moderate stress; 30–50 severe stress [18].

The K10 was translated into Farsi then its reliability was tested by Cronbach alpha in a pilot study with 30 students ($\alpha = 0.91$). The instrument used in this study included demographic data such as students' age, sex and year of study, type of living accommodation and motivation to study medicine, physical health problems (scores from 1–5) and ability to work or carry out normal activities.

Data collection took place in May 2009. Questionnaires were distributed to the subjects to complete 1 month before the beginning of the examination period in order to minimize the extra stress symptoms. The students were given assurances about the confidentiality of their responses and names were not recorded. Verbal consent was obtained from the students and they were allowed to respond to the questionnaire in their own time and in privacy.

Statistical analysis

All data were entered into SPSS, version 11.5 for Windows (double entry of data was used in order to check for data entry accuracy). Normal distribution was confirmed by the Kolmogorov–Smirnov test for continuous variables and data analysis was performed by independent *t*-test, analysis of variance (ANOVA) using Tukey post-hoc comparisons and Pearson correlation. All other measures were subject to descriptive statistics. A *P*-value < 0.05 was considered statistically significant.

Results

A total of 300 students entered the study and completed questionnaires were received from 222 (response rate of 74.0%). The students' demographic characteristics are shown in Table 1. There were 114 men (51.4%) and 108 women (48.6%). The mean (SD) age of the participants was 21.9 (SD 2.2) years, with a range of 18–30 years. Most

Table 1 Mean stress scores of medical students in Isfahan on the Kessler 10-item psychological distress scale (K10) according to their demographic characteristics

Variable	No.	%	Mean (SD) stress score	Test statistic	P-value
Sex				$t = 0.51$	0.960
Male	114	51.4	23.6 (8.2)		
Female	108	48.6	23.6 (6.3)		
Marital status				$t = 1.985$	0.048
Single	208	93.7	23.8 (7.2)		
Married	14	6.3	19.8 (8.0)		
Year of study				$F = 1.292$	0.262
1st	30	13.6	24.6 (6.6)		
2nd	44	19.9	22.4 (6.3)		
3rd	41	18.5	25.1 (8.2)		
4th	58	26.2	22.1 (6.9)		
5th	18	8.1	24.3 (7.0)		
6th	16	7.4	25.9 (7.9)		
7th	15	6.3	22.9 (9.2)		
Academic group				$t = 1.051$	0.294
Pre-clinical	100	45.2	24.1 (7.2)		
Clinical	122	54.8	23.2 (7.4)		
Living accommodation				$F = 1.579$	0.209
Dormitory	167	75.2	23.9 (7.1)		
Parental home	51	23.0	22.3 (7.6)		
Rented accommodation	4	1.8	27.5 (8.5)		
Motivation to study medicine				$F = 3.456^a$	0.033
Interested	168	75.7	22.9 (6.6)		
Family influenced choice	9	4.1	26.2 (10.0)		
No choice	45	20.2	25.8 (8.4)		

^aANOVA test.

SD = standard deviation.

of the respondents (75.2%) lived in halls of residence.

The mean K10 score of the participants was 23.5 (SD 7.2) out of a maximum of 50. The score range was 10–48. The prevalence of stress of all types among the medical students was 61.3% (18.0% suffered mild stress, 22.5% moderate stress and 20.8% severe stress) (Table 2).

There was no statistically significant difference in the stress levels between pre-clinical and clinical students ($t = 1.051$, $P = 0.294$) (Table 1). There was also no significant correlation of mean stress scores across different years of study ($F = 1.292$, $P = 0.262$) or between the sexes ($t = 0.51$, $P = 0.960$). A significant difference was observed between

stress score and marital status ($t = 1.985$, $P = 0.048$). ANOVA showed no difference between the students' type of accommodation and mean stress scores ($F = 1.579$, $P = 0.209$). The relationship with motivation to study and stress levels were significant ($F = 3.456$, $P = 0.033$) and students who mentioned no choice about studying had higher mean scores on stress.

Table 3 shows that the mean number of days that students were unable to work was 4.6. The mean value was significantly higher among students who had scores above the cut-off for stress than those below the cut-off (6.2 days versus 1.9 days). The mean number of days their work was reduced was 3.8 and this was also significantly higher among

students with stress than without stress (4.9 days versus 2.0 days).

The overall prevalence of self-reported physical problems was 19.4%; 4.5% of students reported having severe problems and 14.9% had mild to moderate problems. This difference was statistically significant comparing students with and without stress ($F = 9.451$, $P < 0.001$). The odds ratio shows that the risk of suffering stress was more than 4 times higher for students with mild to moderate stress (OR = 4.42, 95% CI: 1.63–11.98, $P = 0.003$) compared with students with no physical problems. Students with severe physical problems were also 3 times more likely to suffer stress but this was not statistically significant (OR = 3.16, 95% CI: 0.65–15.30,

Table 2 Distribution of medical students according to their scores on the Kessler 10-item psychological distress scale (K10)

Classification	K10 cut-off scores	No.	%
No stress	< 20	86	38.7
Mild stress	20–24	40	18.0
Moderate stress	25–29	50	22.5
Severe stress	30–50	46	20.8
Total		222	100.0

$P = 0.153$) (Table 4). Almost all the respondents with physical health problems (93.7%) had not sought medical care for the problem.

Discussion

The results of this study revealed high levels of stress among medical students in Isfahan. The overall prevalence of scores above the cut-off for stress was 61.3%, which is similar to another study in the Islamic Republic of Iran [17] and a study in Saudi Arabia [16] (61.4% and 57% respectively). Both of the above studies used the K10 stress scale. Another study in the Islamic Republic of Iran using a different instrument that the K10 reported that 44.1% of subjects had a low level of stress, 31.1% average level and 24.8% high level of stress [19]. As reported by other researchers this high level of stress may impair students' professional effectiveness by decreasing their attention span, reducing concentration levels, affecting their decision-making skills and reducing their ability to establish strong physician–patient relationships and it may have a direct

relationship with feelings of hopelessness [19–23].

There was no association between the year of study and stress level. The mean stress score among 1st year students was higher than among 2nd year students but the results were not statistically significant. This finding concurs with Marjani et al.'s study in the Islamic Republic of Iran [17] and Abdulghani in Saudi Arabia [16] using the same tool. However, using different tools than the K10 Stewart et al. indicated that medical students in year 2 had higher scores of anxiety and depression than in year 1 [24] and Aktekin in Turkey reported the scores for some stressful life events for medical students were significantly higher in year 2 than year 1 [25].

We also found no difference in the stress levels between pre-clinical and clinical groups of medical students. This may be because both these phases of study are stressful, albeit in different ways: in the pre-clinical course there is the stress of coping with a new course of study, adjusting to the demands of the high academic workload and fears of

failing or falling behind. In the clinical phase of study there are the stresses of relationships with consultants and of dealing with patients, disease, death and suffering.

Stress was significantly associated with students' self-reported physical problems, with higher mean stress scores among students who reported suffering from physical problems. Students who had higher levels of stress also reported significantly more days when they were unable to work and days reduced. It may be due to stress causing physical problems or vice versa. Abdulghani et al. in Saudi Arabia reported similar findings [16] but Marjani et al.'s study in Islamic Republic of Iran found no statistically significant relationship between students' stress levels and physical problems [17]. In another study in the Islamic Republic of Iran stress was significantly associated with student's general health [26].

Our study showed no differences in mean stress scores between male and female students. This finding is consistent with other international studies using different tools [1,2,5,6,27], although a study in Sweden showed gender differences, with women scoring higher on stress than men [10]. Esfandiari in his study in the Islamic Republic of Iran concluded that female students had more stress and that this caused undesirable effects on their general health [26]. Lower levels of stress among married students than single students in our study suggests that marriage was a protective factor for stress.

Another finding of the current study was that there was a significant relationship between the subjects' level of stress and their motivation to study in the medical field. Although this could be explained by many factors, it is logical that students who reported their motivation was interest in medicine had lower stress scores than others who reported the motivation as family coercion or no choice of subject.

Table 3 Association between stress on the Kessler 10-item psychological distress scale (K10) and the mean number of days unable to work and days of work reduced

Stress ^a	No.	No. of days unable to work Mean (SD)	No. of days of work reduced Mean (SD)
No	86	1.9 (2.5)	2.0 (4.2)
Yes	136	6.2 (7.3)	4.9 (6.3)
<i>P</i> -value ^b		< 0.001	< 0.001

^aAbove (≥ 20) or below (< 20) cut-off score on the K10; ^b*t*-test.
SD = standard deviation.

Table 4 Association between stress on the Kessler 10-item psychological distress scale (K10) and physical problems suffered

Physical problems	Stress ^a				OR	95% CI	<i>P</i> -value ^b
	No		Yes				
	No.	%	No.	%			
None	79	35.6	100	45.0	1	–	
Mild to moderate	5	2.3	28	12.6	4.42	1.63–11.98	0.003
Severe	2	0.9	8	3.6	3.16	0.65–15.30	0.153

^aAbove (≥ 20) or below (< 20) cut-off score on the K10; ^bLogistic regression analysis.

OR = odds ratio; CI = confidence interval.

Several limitations of this study restrict the generalizability of the findings. The findings are based on a self-reported questionnaire which relies on the honesty of those completing it and on subjective impressions of stress. Furthermore, we have data from only one medical school. A low rate of response was evident among the 5th, 6th and 7th year students who were busy with clinical work.

Medical students especially those in the 1st year may benefit from better social and psychological support to cope with stress. With early diagnosis, case finding and effective psychological services, possible future illness may be prevented. Concerns about workload, performance and personal competence are particularly marked in the 1st year of medical school [5,8]. Stress management programmes for 1st-year

medical students may also serve as a buffer to some of those stresses in the students' future careers. Klamen reported that stress management workshops for medical students made students more aware of the current and future stresses they were facing and provided them with useful tools of stress management and personal insights [28]. In the United Kingdom, the General Medical Council recommends that medical schools should have mechanisms in place to identify symptoms of stress that might be early signs of mental illness [29]. Medical schools in the United States of America and Canada tackle the problem at an earlier stage by undertaking health promotion programmes. These have been shown to reduce the effects of stress on medical students' health and academic performance [30].

In conclusion, the results of this study suggest that interventions are needed to tackle stress and improve Iranian medical students' physical and psychological well-being. Large, prospective, multicentre studies will help to identify the associated morbidity, causes and consequences of stress among medical students in the Islamic Republic of Iran.

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Correction

S.A. Alghanim. Self-medication practice among patients in a public health care system. *Eastern Mediterranean Health Journal*, 2011, 17(2):409–416. The title in the Arabic abstract should read:

ممارسة المداواة الذاتية لدى المرضى في ظل وجود نظام صحي عام